

SHORT REPORT

Lung Cancer Risk in Women in Relation to Tar Yields of Cigarettes¹

CHRISTIAN VUTUC AND MICHAEL KUNZE

*Institute of Hygiene, Department of Social Medicine, Kinderspitalgasse 15,
A-1095, Vienna, Austria*

Of 297 female lung cancer patients studied, 188 or 63% were cigarette smokers, significantly ($P < 1\%$) more than in the control group (119 = 21% of 580). In relation to women who had never smoked, the adjusted (for age, total years smoked, and average number of cigarettes smoked per day) lung cancer risk for smokers who had exclusively smoked cigarettes belonging to group I (<15 mg tar/cig.) was $R = 1.5$, for group II-type cigarettes (15-24 mg tar/cig.) $R = 2.7$ ($P < 1\%$), and for group III (>24 mg tar/cig.) $R = 6.3$. The risks for smokers who had smoked primarily cigarettes belonging to groups I, II, and III were $R = 2.6$, $R = 4.4$ ($P < 1\%$), and $R = 8.9$ ($P < 1\%$), respectively.

INTRODUCTION

The market shares of filter cigarettes increased from 8.8% in 1960 to 92.5% in 1977. Corresponding to this trend, the smoke values (measurement following ISO) of the average Austrian cigarette decreased for tar by 54.5% from 33.67 mg/cig. to 15.3 mg/cig., and for nicotine by 63% from 1.95 mg/cig. to 0.72 mg/cig. (5). There is also evidence from U.S. studies that the tumorigenic potential of cigarette tar has decreased (12, 13); this might also apply for Austrian cigarettes, which are blended products similar to U.S. brands (5). From the viewpoint of preventive medicine, it is of major interest to determine how reductions of tar yield influence the lung cancer risk to the smoker. This article deals with the lung cancer risk of female smokers in relation to the tar yields of cigarettes smoked.

MATERIALS AND METHODS

In a case-control study described in detail elsewhere (7, 8, 11), 297 female patients with histopathologically confirmed lung cancer were interviewed at time of diagnosis using a standardized questionnaire (1, 8). The study was undertaken on a nationwide basis in 15 lung cancer centers in Austria from the end of 1976 through 1980. The control group consisted of 580 women, 50% drawn from inpatients at the hospital where the lung cancer patient was diagnosed, and 50% from the neighborhoods where the lung cancer patients lived. Controls were selected based on the absence of a tobacco-related disease and according to the age of the patient (± 5 years). Tobacco-related disease was defined as a cancer of the lung, larynx, mouth, esophagus, bladder, pancreas, liver, or kidney; myocardial infarction.

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tion: stroke; peripheral vascular disease, abdominal disease, or abdominal aortic aneurysm; chronic bronchitis or chronic obstructive pulmonary disease; or gastric ulcer. In addition, patients with cirrhosis of the liver were excluded from the control group.

Of the 297 patients and 580 controls, 32 cases and 69 controls belonged to the age group up to 50 years, 58 cases and 128 controls belonged to the age group 51–60 years, 103 cases and 227 controls belonged to the age group 61–70 years, and 104 cases and 156 controls belonged to the age group above 70 years. The smoking histories of cases and controls (smokers and ex-smokers who only smoked cigarettes) included: all cigarette brands ever smoked and for each brand the duration of consumption and the number of cigarettes smoked daily. The cigarette brands reported by the respondents were allocated to one of three groups (6) according to their tar yields (2) (group I: < 15 mg of tar/cig.; group II: 15–24 mg/cig.; group III: >24 mg/cig.). Adjusted (age, duration, quantity) relative risks (9) were estimated in relation to women who had never smoked, smokers who only had smoked cigarettes belonging to group I, or group II, or group III, respectively, and smokers who had smoked cigarettes belonging to group I, or group II, or group III as the most dominating brands (at least 2/3 of the total duration of the smoking habit). Age categories used in the adjustment were: up to 50, 51–60, 61–70, and above 70 years. The respective categories for total duration of smoking habit: below 10, 10–19, 20–29, 30–39, 40 and more years and for average number of cigarettes smoked per day: up to 10, 11–20, more than 20 cig./day. The 95% confidence limits were calculated by the method of Miettinen (10).

RESULTS

One hundred and eighty-eight or 63% of the 297 female lung cancer patients were cigarette smokers (ex-smokers included); in the control group 21% (119 out of 580) were smokers. Patients significantly more often smoked cigarettes than controls (χ^2 156.14; $P < 1\%$). Table 1 shows the lung cancer risk adjusted for age, total duration of smoking habit, and average number of cigarettes smoked per day for women who had smoked exclusively or as dominating brands cigarettes belonging to group I, or group II, or group III in relation to women who had never smoked. A dose-response relationship can be demonstrated. There is a significant increase of lung cancer risk with the increase of tar yields of cigarettes consumed exclusively or as dominating brands.

DISCUSSION

Our results confirm previous studies (3, 4, 14) demonstrating a dose-response relationship between lung cancer risk and tar yields in female cigarette smokers. The interpretation of the results referring to group I cigarettes should be made carefully because of small sample sizes. It should also be noted that group I cigarettes became available in Austria only in the mid 1960's (5). Further epidemiological studies should therefore concentrate on cancer risk in smokers of low tar cigarettes.

These results may be translated into possible health policy goals as follows: It seems feasible to influence lung cancer risk by reducing tar yields and aiming for

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TABLE I
FEMALE CIGARETTE SMOKERS, LUNG CANCER RISK ADJUSTED FOR AGE, YEARS OF SMOKING HABIT, AND AVERAGE NUMBER OF CIGARETTES SMOKED PER DAY

		Exclusively cigarettes smoked belonging to:							
		Never smoked		Group I (<15 mg tar/cig.)		Group II (15-24 mg tar/cig.)		Group III (>24 mg tar/cig.)	
		Cases	Controls	Cases	Controls	Cases	Controls	Cases	Controls
R		109	461	1	3	19	29	23	15
95% confidence interval		1.0		1.5		2.7		6.3	
χ^2				0.1-14.2		1.5-4.7		3.5-11.3	
				0.08		10.30*		35.07*	
Cigarettes as dominating brands smoked belonging to:									
		Never smoked		Group I		Group II		Group III	
		Cases	Controls	Cases	Controls	Cases	Controls	Cases	Controls
R		109	461	4	6	50	49	134	64
95% confidence interval		1.0		2.6		4.4		8.9	
χ^2				0.8-8.3		2.9-6.5		6.7-11.7	
				1.38		50.15*		227.16*	

* $P < 1\%$.

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greater market shares for low tar cigarettes. One should, however, see this development under the concept of a shrinking cigarette market. Although not smoking is the only really safe way to avoid lung cancer, reality tells us that people will continue to smoke for decades. Therefore, a first step would be removing high tar cigarettes (groups II and III of our classification) from the market. As already mentioned, further epidemiological studies on smokers of low tar cigarettes will be needed to define the upper limits of tar yields of cigarettes belonging to group I.

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